REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendment and in view of the reasons that follow. Claim 19 is currently being amended. Claims 1, 2, 4-12, 14-17, and 19-22 are now pending in this application.

Claim 19 was rejected under 35 U.S.C. § 112, second paragraph. Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,369,378 (Kosaka1). Claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,355,092 (Kosaka2) in view of U.S. Patent 5,313,493 (Dutta). Claims 1,2, 4-12, 14-17, and 19-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kosaka2 in view of Kosaka1 and further in view of Dutta. Applicant respectfully traverses these rejections.

I.   Rejection of Claim 19 under 35 U.S.C. § 112

Claim 19 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because claim 19 depends from claim 18, which was cancelled. Applicant thanks the Examiner for pointing out this error. Claim 19 has been amended to depend from claim 15 to correct this error. As a result, Applicant respectfully requests withdrawal of the rejection.

II.   Rejection of Claim 21 under 35 U.S.C. § 103(a)

In the Office Action, claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kosaka1. Applicant respectfully traverses this rejection because the Examiner has failed to present a prima facie case of obviousness. MPEP § 2143 states:

> To establish a prima facie case of obviousness, three basic criteria
> must be met. First, there must be some suggestion or motivation,
> either in the references themselves or in the knowledge generally
> available to one of ordinary skill in the art, to modify the reference
> or to combine reference teachings. Second, there must be a
> reasonable expectation of success. Finally, the prior art reference

(or references when combined) must teach or suggest all the claim limitations.

At a minimum, the Examiner has failed to demonstrate that Kosaka1 discloses, teaches, or suggests all of the claim limitations as recited in claim 21.

Claim 21 recites:

mapping the translated bits to DQPSK symbols using a look up table wherein the look up table includes the following values stored therein:

Bit Combination	Real	Imaginary
000	0	1
001	-0.707	0.707
010	-1	0
011	-0.707	-0.707
100	0	-1
101	0.707	-0.707
110	1	0
111	0.707	0.707

On pages 2-3 of the Office Action dated 10/27/2005, the Examiner states:

Kosaka1 doesn't specifically provide the look up table indicated in his claim. If the look up table provided by Kosaka1 in figure 3 is rotated PI/4 to locate point a in the Q axis will result the same look up table that the one provided in this claim (see figures 3, 4 and 19). This modification is obvious because is equivalent to the figure 3. The suggestion/motivation for doing so would have been to reduce the complexity of the computation locating some point in the axis so one of the coordinate is zero. Therefore, it would have

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been obvious to modify Kosaka1 to obtain the invention as
specified in claim 21.

Applicant disagrees. Examiner's suggestion/motivation for rotating FIG. 3 by an angle of PI/4, "to reduce the complexity of the computation locating some point in the axis so now of the coordinate is zero," is only true relative to Figures 4 and 19, which do not result in an equivalent table. FIG. 3 already locates points in the axis so that a coordinate is zero. Thus, there is no suggestion/motivation for making such a modification.

Modifying Figures 4 and 19 result in the following table:

Bit Combination	Real	Imaginary
000	1	0.5
001	0.5	1
010	-0.5	1
011	-1	0.5
100	-1	-0.5
101	-0.5	-1
110	0.5	-1
111	1	-0.5

The resulting table is not equivalent to the look up table of claim 21. Thus, there is no suggestion or motivation to rotate FIG. 3 of Kosaka1 by an angle of PI/4. An obviousness rejection cannot properly be maintained where there is no suggestion or motivation to modify the reference used in the rejection. Therefore, Applicant respectfully requests withdrawal of the rejection of claim 21.

III.   Rejection of Claim 22 under 35 U.S.C. § 103(a)

In the Office Action, claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Kosaka2 in view of Dutta. Applicant respectfully traverses this rejection

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because the Examiner has failed to present a prima facie case of obviousness. At a minimum, the Examiner has failed to demonstrate that Kosaka2 and Dutta alone or in combination disclose, teach, or suggest all of the claim limitations as recited in claim 22.

Claim 22 recites:

> translating the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols utilizing the formula
>
> $S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$
>
> where S(t) is a DQPSK symbol at time t, and SQPSK(t) is a QPSK symbol at time t

On pages 3-4 of the Office Action dated 10/27/2005, the Examiner states:

> Kosaka2 doesn't disclose utilizing the formula $S_{QPSK}(t) =$ $(real(S(t)) + imag(S(t)) * (real(S(t-1)) - imag(S(t-1)))$, where S(t) is a DQPSK symbol at time t, and $S_{QPSK}(t)$ is a QPSK symbol at time t. Dutta discloses translating the Pi/4 DQPSK symbols into QPSK symbols, using the formula s'(t)=s(t)*s(t-tau). Where s'(t) =S_{QPSK} (t), for tau=1 results that $S_{QPSK}(t) = S'(t) = S(t) * S^*(t-1) = (R(t) +j$ l(t)) * (R(t) + j l(t)) = (real(S(t)) + imag(S(t)) * (real (S(t)) - imag(S(t))); where real(S(t)) = R(t) and imag(S(t)) = j l(t).

Applicant thanks Examiner for recognizing that Kosaka2 fails to disclose, teach, or suggest "translating the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols utilizing the formula $S_{QPSK}(t)$ = $(real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$, where S(t) is a DQPSK symbol at time t, and $S_{QPSK}(t)$ is a QPSK symbol at time t." Examiner, however, points to <u>Dutta</u> as providing this teaching. Applicant respectfully disagrees.

Dutta discloses:

> The inphase and quadrature component of the complex signal, s(t) = x(t) +jy(t), are given by:

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$$x(t) = m(t) \cos (\Delta\omega t + \theta)$$

$$y(t) = m(t) \sin (\Delta\omega t + \theta)$$

The complex signal can also be represented as:

$$\underline{s(t) = m(t)\exp\{j(\Delta\omega t + \theta)\}}$$

The signal s(t) is fed to the differential detector 32 which multiplies it with a delayed and complex conjugated version of itself from a 1-bit delay element 38, the delay being equal to the known bit period, τ. The output of the multiplier is given by:

$$
\begin{aligned}
s'(t) \quad &= s(t)s(t - \tau)^* \\
&= m(t)m(t- \tau)\exp[j\{\Delta\omega\, t - \Delta\omega\, (t - \tau)\}] \\
&= m(t)m(t- \tau)\exp\{j(\Delta\omega\tau)\}
\end{aligned}
$$

where, * denotes a complex conjugate.

The term, m(t)m(t-τ), contains the desired data information (per DPSK modulation), while the complex exponential contributes an error.

(Dutta, Col. 6, lines 23-49, emphasis added). As a result, Dutta describes a conventional downconversion modulation scheme for a differential phase shift keying (DPSK) modulation that requires a complex multiplication. Dutta specifically utilizes the complex form of the signal s(t) to define both the desired data information and the error. Dutta does not contemplate use of the I/Q representation to perform the modulation as does Applicant. Additionally, Dutta describes use of DPSK modulation. Dutta never even contemplates use of Pi/4 differential quadrature phase shift keying (DQPSK) modulation. As well known to those skilled in the art, Pi/4 DQPSK modulation is a baseband signal encoding method that only uses phase shifts of 45° and 135°. Using Pi/4 DQPSK modulation, the information (symbols) are not represented by an absolute phase, as they are when using QPSK encoding, for example, but by a phase difference. The phase transitions are modulated onto a carrier using an I/Q modulator. Thus, use of the equation s'(t) = s(t)s(t - τ)* as shown by Dutta is not to translate Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols at all, but to perform DPSK modulation. As a

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result, Dutta does not disclose, teach, or suggest translation of Pi/4 DQPSK symbols to QPSK symbols using any equation.

Additionally, the equation $s'(t) = s(t)s(t - \tau)^*$, from Dutta, must only be used within the proper context. Taking a delayed and complex conjugated version of a signal is used extensively throughout the field of mathematics and engineering. The result of using the equation differs significantly, however, based on the definition of $s(t)$ and the resulting meaning of $s'(t)$. As a result, the Examiner improperly uses the equation $s'(t) = s(t)s(t - \tau)^*$ to derive the equation $S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$, which is wholly different from the result taught by Dutta because $s(t)$ and the resulting $s'(t)$ are defined differently. Thus, even if the Examiner can start with $s'(t) = s(t)s(t - \tau)^*$ and arrive at the equation, $(real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$ of claim 22 through substitution, the usage of the equation for "translating the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols," is not disclosed in Dutta nor is the equation, $S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$, where $S(t)$ is a DQPSK symbol at time t, and $S_{QPSK}(t)$ is a QPSK symbol at time t, itself disclosed. As a result, neither Kosaka2 nor Dutta disclose, suggest, or teach all of the limitations of claim 22. Therefore, Applicant respectfully requests withdrawal of the rejection of claim 22.

IV.   Rejection of Claims 1, 2, 4-12, 14-17, 19-20 under 35 U.S.C. § 103(a)

Claims 1, 2, 4-12, 14-17, 19-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kosaka2, in view of Kosaka1, and further in view of Dutta. Applicant respectfully traverses this rejection because the Examiner has failed to present a prima facie case of obviousness. At a minimum, the Examiner has failed to demonstrate that Kosaka1, Kosaka2, and Dutta alone or in combination disclose, teach, or suggest all of the claim limitations as recited in independent claims 1, 10, and 15.

Claim 1 recites:

translating the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols utilizing the formula

$S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$

where S(t) is a DQPSK symbol at time t, and SQPSK(t) is a QPSK symbol at time t.

Claim 10 recites:

translate the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols utilizing the formula

$S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$

where S(t) is a DQPSK symbol at time t, and SQPSK(t) is a QPSK symbol at time t.

Claim 15 recites:

means for translating the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols utilizing the formula

$S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$

where S(t) is a DQPSK symbol at time t, and SQPSK(t) is a QPSK symbol at time t.

On page 4 of the Office Action dated 10/27/2005, the Examiner states:

As per claims 1 and 15, …. Kosaka2 does not teach utilizing the formula $S_{QPSK}(t) = (real(S(t)) + imag(S(t)) * (real(S(t-1)) - imag(S(t-1)))$, where S(t) is a DQPSK symbol at time t, and $S_{QPSK}(t)$ is a QPSK symbol at time t; Dutta discloses translating the Pi/4 DQPSK symbols into QPSK symbols, using the formula s'(t)=s(t)*s(t-tau). Where s'(t) = S_{QPSK} (t), for tau=1 results that $S_{QPSK}(t) = S'(t) = S(t) * S^*(t-1) = (R(t) + j\, l(t)) * (R(t) + j\, l(t))) = (real(S(t)) + imag(S(t))) * (real(S(t)) - imag(S(t)))$; where real (S(t)) = R(t) and imag(S(t)) = j l(t).

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On pages 5-6 of the Office Action dated 10/27/2005, the Examiner states:

> As per claim 10 .... Kosaka2 does not teach utilizing the formula
> $S_{QPSK}(t) = (real(S(t)) + imag(S(t)) * (real(S(t-1)) - imag(S(t-1)))$,
> where S(t) is a DQPSK symbol at time t, and $S_{QPSK}(t)$ is a QPSK
> symbol at time t; obtaining communication bits indicative of the
> outbound communication signal. Dutta discloses translating the
> Pi/4 DQPSK symbols into QPSK symbols, using the formula
> s'(t)=s(t)*s(t-tau). Where s'(t) = $S_{QPSK}(t)$, for tau=1 results that
> $S_{QPSK}(t) = S'(t) = S(t) * S^*(t-1) = (R(t) + j\ 1\ (t)) * (R(t) + j\ 1\ (t)) =$
> $(real(S(t)) + imag(S(t))) * (real(S(t)) - imag(S(t)))$;where real(S(t))
> = R(t) and imag(S(t)) = j l(t)).

Applicant respectfully disagrees. As discussed in Section III. above, neither Kosaka2 nor Dutta disclose, teach, or suggest "translating the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols utilizing the formula $S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$, where S(t) is a DQPSK symbol at time t, and $S_{QPSK}(t)$ is a QPSK symbol at time t."

Kosaka1 also fails to disclose, teach, or suggest "translating the Pi/4 DQPSK symbols into quadrature phase shift keying (QPSK) symbols utilizing the formula $S_{QPSK}(t) = (real(S(t)) + imag(S(t))) * (real(S(t-1)) - imag(S(t-1)))$, where S(t) is a DQPSK symbol at time t, and $S_{QPSK}(t)$ is a QPSK symbol at time t." As a result, Kosaka1, Kosaka2, and Dutta fail to disclose, suggest, or teach all of the limitations of claims 1, 10, and 15. An obviousness rejection cannot properly be maintained where the references used in the rejection do not disclose all of the recited claim elements. As a result, Applicant respectfully requests withdrawal of the rejection of claims 1, 10, and 15. Applicant respectfully traverses any arguments posed by Examiner relative to claims 2, 4-9, 11, 12, 14, 16, 17, 19, and 20 as they are allowable for at least the reasons outlined above relative to claims 1, 10, and 15. Therefore, Applicant respectfully requests withdrawal of the rejection of claims 1, 2, 4-12, 14-17, 19, and 20.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-2179. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-2179.

PLEASE MAIL CORRESPONDENCE TO: Respectfully submitted,

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